News In Health

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The Complexities of Asthma

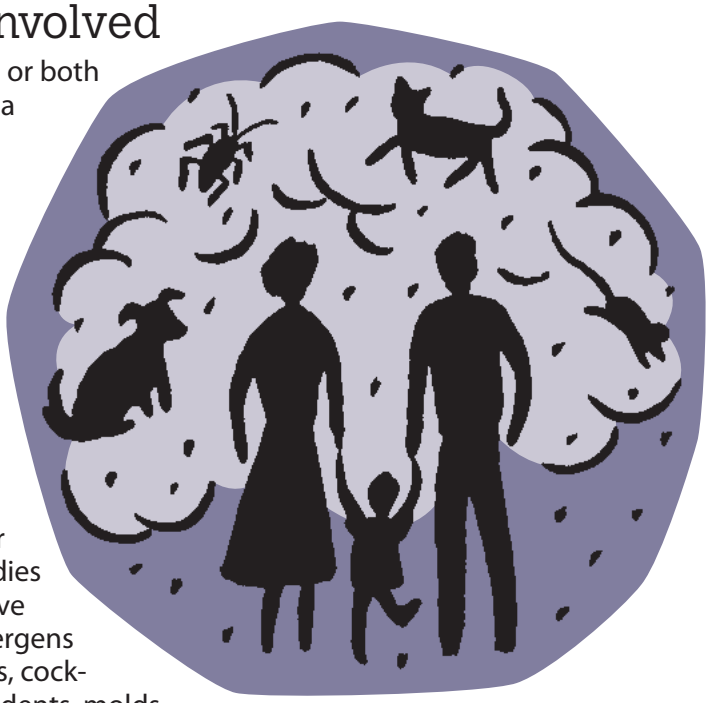
Genes, Environmental Factors Both Involved

You probably know of at least one child with severe **asthma**. It's just more common these days. Once considered a minor ailment affecting only a few, asthma is now the most common chronic disorder in childhood, affecting an estimated 6.2 million children under the age of 18. The trend has been particularly disturbing among inner-city children. Research is now uncovering the complex mix of genes and environmental factors that cause the disease.

Asthma is a disease that's caused by swelling and inflammation of your airways. When your airways become narrower, less air can get through to your lungs. That's what causes the wheezing (a whistling sound when you breathe), coughing, chest tightness and trouble breathing that we know as the symptoms of asthma.

Despite improvements in diagnosis and management, the prevalence of asthma has increased over the past 15 years. In the U.S. alone, 20.5 million people—6.7% of adults and 8.5% of children—have been diagnosed with asthma.

Research shows that asthma runs in families. When one or both parents have asthma, a child is more likely to develop it, too. This is known as genetic susceptibility.



However, environmental factors also contribute. Allergies and asthma are closely intertwined, and allergy-causing substances called **allergens** in the environment are a major cause of asthma. Studies in the last 10 years have shows that indoor allergens from house dust mites, cockroaches, dogs, cats, rodents, molds and fungi are among the most important asthma triggers.

"Home carpeting can be a problem because children can develop asthmatic reactions to the house dust mites that live in the carpet," says Dr. David Schwartz, director of the NIH's National Institute of Environmental Health Sciences (NIEHS).

From 1998 to 2002, NIEHS scientists, along with researchers from the Department of Housing and Urban Development, conducted an extensive survey to assess how widespread these indoor allergens are in American homes. The results of this survey, the National Survey of Lead and Allergens in Housing, showed that more than 46% of the homes surveyed had levels of dust mite allergens high enough to produce allergic reactions, and nearly a quarter had levels high enough to trigger asthma symptoms in genetically susceptible people.

The survey also showed that nearly two-thirds of U.S. homes have detectable levels of cockroach allergens, with higher levels in high-rise apartments, urban settings, older homes and homes of low-income households. About 10% had cockroach allergen levels above the threshold for triggering asthma symptoms.

"One of the most surprising findings from the national survey was that 100% of homes had detectable levels of dog and cat allergen, even

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Definitions

Allergen
A substance that can cause allergies.

Asthma
A chronic disease that causes your airways, the tubes that carry air in and out of your lungs, to get narrower so that less air flows through. Symptoms include wheezing (a whistling sound when you breathe), coughing, chest tightness and trouble breathing.

Inside News

Wise Choices
Know the Signs and Symptoms of Asthma

Not all people have these asthma symptoms, and symptoms may vary from one asthma attack to another. Common symptoms include:

- Coughing. Coughing from asthma is often worse at night or early in the morning, making it hard to sleep.
- Wheezing, a whistling or squeaky sound when you breathe.
- Chest tightness. This can feel like something is squeezing or sitting on your chest.
- Shortness of breath. Some people say they can't catch their breath, or they feel breathless or out of breath. You may feel like you can't get enough air in or out of your lungs.
- Fast or noisy breathing.

With proper treatment most people with asthma can expect to have few or no symptoms. See your doctor if you suspect you might have asthma.

Source: National Heart, Lung, and Blood Institute, NIH

What is Asthma?: www.nhlbi.nih.gov/health/dci/Diseases/Asthma/Asthma_WhatIs.html

Asthma and Allergy Prevention: www.niehs.nih.gov/airborne/prevent/intro.html

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though dogs were present in only 32% of the surveyed homes, and cat ownership was reported in only 24%," says Dr. Darryl Zeldin, a scientist with NIEHS and senior author of the study.

The researchers then collaborated with scientists from Harvard University and the University of Washington to evaluate some practical methods for reducing house dust mite allergens in the bedrooms of low-income Seattle homes.

"The research showed that some simple steps—washing the bedding in hot water, putting allergen-impermeable covers on the pillows, box springs and mattresses, and vacuuming and steam-cleaning the carpets and upholstered furniture—can significantly reduce dust mite allergen levels," Zeldin says.

They also conducted a 6-month trial to test a method for reducing cockroach allergen levels in low-income, urban homes. It included cockroach extermination, professional cleaning and in-home lessons on asthma management. At the end of 6 months, cockroach allergen levels were reduced by 84% on bedroom floors and in beds, and by 96% on kitchen floors. A follow-up study showed that these reductions could be maintained with continued cockroach control.

NIEHS also partnered with NIH's National Institute of Allergy and Infectious Diseases to develop a cost-effective program aimed at reducing asthma severity among predominantly African-American and Hispanic children in low socioeconomic areas. The study, called the Inner-City Asthma Study, showed that a program to reduce allergens in the home can result in fewer asthma symptoms in children.

While much asthma research has focused on indoor allergens, scientists are realizing that outdoor pollutants also play a major role. NIEHS-funded researchers at the University of Southern California's Keck School of Medicine studied air pollution levels in 10 Southern California cities and found that the closer children live to a freeway, the greater their chances of being diagnosed with asthma. They saw a relationship between higher levels of asthma and certain pollutants that come from the burning of fossil fuels (like the exhaust of a car or truck), as well as from emissions from industrial plants.

Armed with a better understanding of asthma's environmental triggers, NIEHS researchers want to learn more about which genes make people susceptible to developing asthma when they encounter these triggers. Using a technique called gene expression profiling, researchers will screen thousands of genes at once to identify which genes are activated when a patient's airways become obstructed or inflamed.

"Once we learn more about how these genes differ from one person to another, we may be able to explain why some people develop asthma while others remain unaffected," Schwartz says.

A better understanding of how asthma develops will help researchers design more effective strategies for prevention and treatment. In the meantime, talk to your doctor or use the resources listed here to learn more about how you can prevent asthma symptoms. ■

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Diabetes Widespread in Adults

One-Third Still Don't Know They Have It

In a new analysis of national survey data, researchers found that the prevalence of **diabetes** in U.S. adults is continuing to rise. And despite efforts to raise awareness of the problem, about a third of adults with diabetes still don't know they have it.

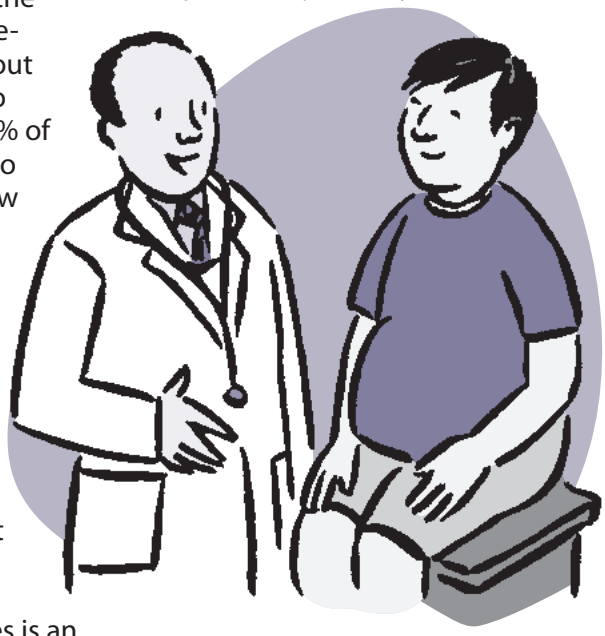
Diabetes is a group of diseases marked by high levels of **glucose** in the blood. Persistent high levels can lead to blindness, kidney failure, amputations, heart disease and stroke.

Researchers at NIH and the Centers for Disease Control and Prevention (CDC) analyzed data from a national sample of U.S. adults 20 years old and over who took part in the National Health and Nutrition Examination Survey. Participants were interviewed in their homes and given a physical exam with a blood test, including a glucose reading taken after an overnight fast.

The researchers found that the prevalence of diagnosed diabetes in U.S. adults rose from about 5.1% in the years 1988-1994 to 6.5% in 1999-2002. About 2.8% of U.S. adults, a third of those who have diabetes, don't even know they have it.

The study also found that about a quarter of U.S. adults have impaired fasting glucose, a form of **pre-diabetes**. People with pre-diabetes have an increased risk for developing **type 2 diabetes**, the most common form of diabetes, and for heart disease and stroke.

Knowing whether you have pre-diabetes or type 2 diabetes is an important step. If you have pre-diabetes, you may be able to prevent or delay type 2 diabetes by cutting calories and increasing your physical activity to lose a modest amount of weight. A major study of people with pre-diabetes showed that lifestyle changes leading to a 5-7% weight loss lowered diabetes onset by 58%.



If you have diabetes, controlling your blood glucose, blood pressure and cholesterol will prevent or delay the complications of diabetes. Be sure to talk to your health care professional about your risk. ■

National Diabetes Education Program:
www.ndep.nih.gov

Diabetes Statistics:
diabetes.niddk.nih.gov/dm/pubs/statistics/index.htm

Definitions

Diabetes
A disease in which the body has trouble controlling the level of glucose in the blood. In time, it can lead to serious problems including heart disease, blindness, kidney failure and nerve damage.

Glucose
A type of sugar. When the glucose level in your blood gets too high, it can damage your tissues and organs.

Pre-diabetes
A condition in which your blood glucose level is higher than normal but not high enough for a diagnosis of diabetes. It puts you at increased risk for developing type 2 diabetes, heart disease and stroke.

Type 2 Diabetes
Formerly called adult-onset diabetes, this is the most common form of diabetes. People can develop it at any age. Being overweight and inactive increase the chances of developing type 2 diabetes.

Wise Choices
At Risk for Diabetes?

If you're over 45, ask your health care provider about testing for pre-diabetes or diabetes. You should also ask about testing if you're younger than 45, overweight, and have another risk factor, such as you:

- are 45 or older
- have a family history of diabetes
- are overweight
- have an inactive lifestyle (exercise less than three times a week)
- are a member of a high-risk ethnic population such as African American, Hispanic/Latino American, American Indian and Alaska Native, Asian American or Pacific Islander
- have high blood pressure
- have a low HDL cholesterol level or a high triglyceride level
- have had diabetes that developed during pregnancy (gestational diabetes) or have given birth to a baby weighing more than nine pounds
- have polycystic ovary syndrome, a disorder that affects the female reproductive system
- have acanthosis nigricans (dark, thick skin near neck or armpits)
- have a history of disease of the blood vessels to the heart, brain or legs
- have had an impaired glucose reading in a previous test

Health Capsules

Joint, Muscle Problems for Overweight Youth

Children and adolescents who are overweight are more likely than their normal weight counterparts to suffer bone fractures and have joint and muscle pains, according to a new study from NIH's National Institute of Child Health and Human Development. Overweight youth in the study were also more likely to develop changes in the knee joint that make movement more difficult.

A total of 355 children and adolescents were classified as overweight (227) or non-overweight (128). The children had a physical examination and answered questions about whether they had any joint, bone or muscle-related problems. They were also asked about the impact their weight had on their quality of life, such as whether they have trouble using stairs, feel clumsy or awkward, or have trouble getting up from chairs. In addition, the researchers used a technique called Dual Energy X-Ray Absorptiometry (DXA) to detect any effects of being overweight on the feet, ankles and knees.

Bone fractures and muscle and joint pain were more common in the overweight youth. Their most common joint complaint was knee pain. They were more likely to report mobility problems as well. DXA scans showed that overweight youth were also more likely to have changes in how the bones of the thigh and leg meet at their knees.

The researchers noted that, while overweight children and adults tend to have stronger bones than their non-overweight counterparts, that didn't protect those in the study from bone fractures. This may be because someone who's overweight can fall with greater force. Other studies have suggested that overweight boys also have poorer balance, and so are more likely to fall.

"Bone, muscle and joint problems are particularly troubling in this age group," NIH Director Dr. Elias A. Zerhouni said. "If overweight youth fail to attain normal weight, they will likely experience an even greater incidence of these problems when they reach later life." ■

We Can! (Ways to Enhance Children's Activity and Nutrition): wecan.nhlbi.nih.gov, or call toll-free 1-866-35-WECAN

Smoking Affects Allergy in Infants

Infants as young as 6 months old can become allergic to things they breathe in, bringing a stuffy nose, sneezing and other symptoms. In a new study of the environmental factors that might be involved, researchers at the University of Cincinnati found that exposure to more than 20 cigarettes a day was associated with an increased risk of developing such allergies by age one. Mold, another suspected culprit, didn't increase the risk for allergy, but it did increase the risk of upper respiratory infections.

Researchers, supported by grants from NIH's National Institute of Environmental Health Sciences, looked at 633 infants under 1 year old. They evaluated the impact of tobacco smoke, visible mold, pets, siblings, daycare attendance and breastfeeding practices on both allergy and upper respiratory infections.

They found that infants who are exposed to 20 or more cigarettes per day were almost 3 times more likely to have allergies to airborne compounds at age 1 as those who weren't exposed. Infants living in high mold homes were over 5 times more likely to have upper respiratory infections than those who lived in homes where mold wasn't visible. Infants with 2 or more older siblings actually had fewer allergy episodes in the first year. Race, gender, pet ownership and breastfeeding practices didn't make any difference.

Some of these links have been reported before in older children and adults, but this is the first study to look at all these factors in infants under the age of 1. These findings highlight the importance of environmental exposures during the first year of life. Don't smoke around your infants, and try to get rid of any mold in your house. ■

Asthma and Allergy Prevention: www.niehs.nih.gov/airborne/prevent/intro.html

Smoking Cessation: health.nih.gov/result.asp?disease_id=607&terms=smoking

Featured Web Site

Tox Town

www.toxtown.nlm.nih.gov

A Web-based introduction to environmental health risks and toxic chemicals. Tox Town uses neighborhood scenes—the Farm, City, Town and US-Mexico Border—along with color, graphics, sounds and animation to explain the connections between chemicals, the environment and your health. *From NIH's National Library of Medicine.*